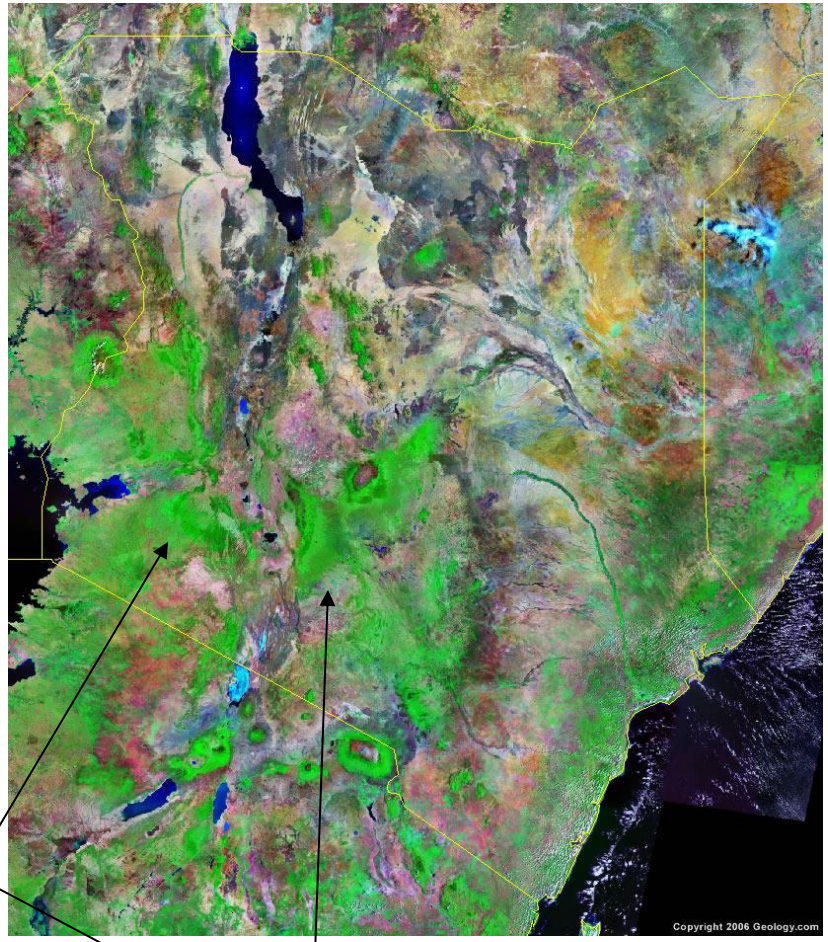
Early detection and treatment for Esophageal Cancer in Africa

Dr Michael Mwachiro
Tenwek Hospital

NCI-IARC ESCC Tumor Workshop

Where is Tenwek Hospital?



Tenwek

Nairobi

Tenwek Hospital

Identification of Precursor Lesions

13-year Follow-up of Biopsied Patients

Initial Diagnosis	Number of Subjects	Cumulative Incidence (%)	Relative Risk[1]
Normal	375	8.3	1.0 (ref)
Acanthosis	77	7.8	0.9
Esophagitis	33	6.1	0.8
Basal Cell Hyperplasia	40	15.0	1.9
Mild Dysplasia	76	23.7	2.9*
Mod Dysplasia	30	50.0	9.8*
Sev Dysplasia	23	73.9	28.3*
Carcinoma-in-situ	16	75.0	34.4*
Total	670	16.7	

[1]adjusted for age, sex, smoking, alcohol use, 1983 cytology dx and treatment group

* $p < 0.05$

Wang et al Gut 2005

Esophageal Balloon Cytology
Cytology - Histology Comparisons

	CSS1	CSS1	CSS2	CSS2
China				
Sensitivity	47%	24%	46%	39%
Specificity	81%	92%	84%	85%

Roth et al, Cancer 1997; Pan et al, Acta Cytol 2008

Kenya

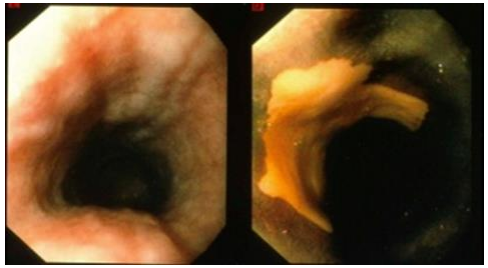
Sensitivity	52%
Dysplasia	2.6%

White RE, et al. Gastroenterology , 2004

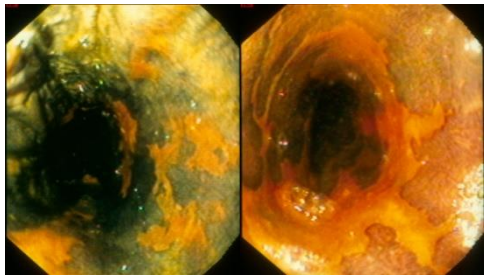
Endoscopic Localization of Dysplasia

Mucosal staining with Lugol's iodine solution

- Lugol's iodine stain: 12g I^2 + 24g KI in 1L H_2O
- Make it up yourself: right formula, fresh



- Iodine reversibly stains glycogen (abundant in normal superficial squamous cells, absent in rapidly dividing cells); → normal epithelium is brown, dysplasia is unstained



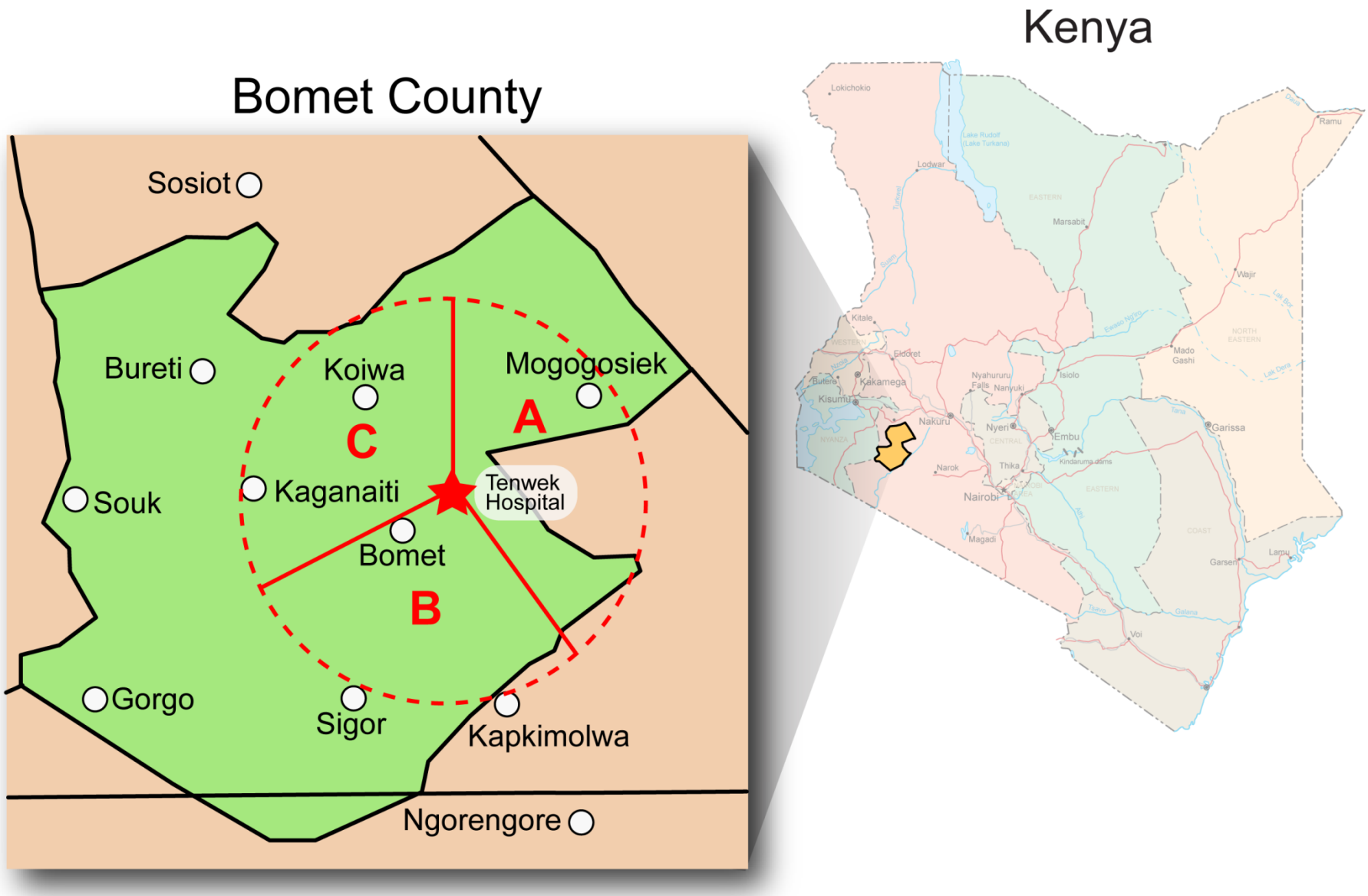
- Sensitivity for HGD = 95%

Esophageal Squamous Dysplasia is Common in Asymptomatic Kenyans: A Prospective, Community-Based, Cross Sectional Study- (**The STEP study**)

Am J Gastroenterol 23 February 2016; doi: 10.1038/ajg.2016.26

METHODS

- 305 asymptomatic adult residents of villages within 50 km of Tenwek Hospital completed a detailed survey and underwent videoendoscopy of the esophagus with Lugol's staining, mapping of identified lesions, and biopsy.
- Each subject was classified by their worst biopsy diagnosis, and the overall prevalence of ESD, the age-adjusted prevalence of ESD and the sex- and age-specific prevalence of ESD by decade were calculated.
- The association between potential risk factors and ESD was analyzed by univariate and multivariate logistic regression.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Kitale
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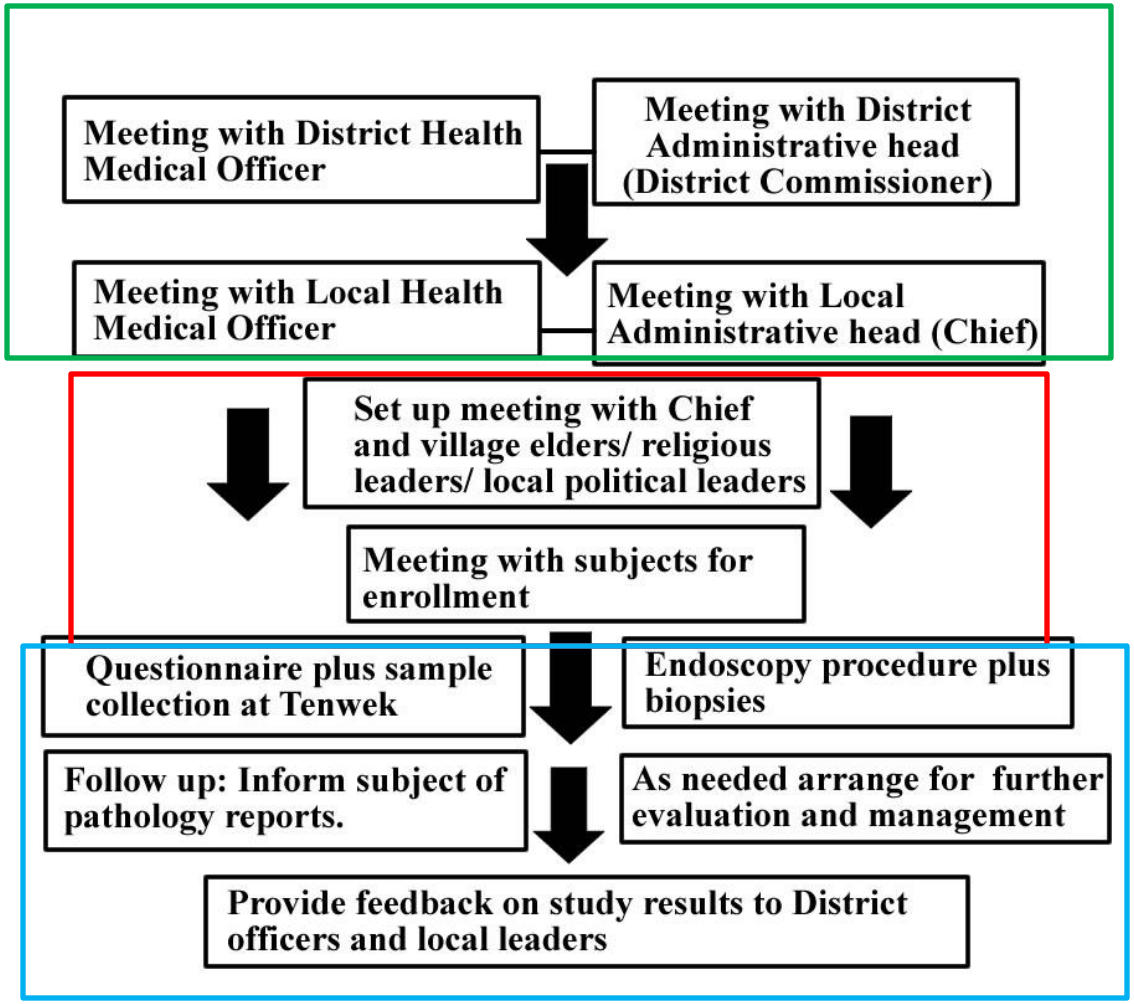
Kakamega
Nyahururu Falls
Nanyuki
Isiolo
Mado Gashi
Kisumu
Nakuru
Nyeri
Embu
Garissa
Narok
Thika
Nairobi
Magadi
Garsen
Lamu
Voi

Study area

The STEP Study

Recruitment Model



RESULTS

Histologic Diagnoses

Diagnosis	**Number**	**N (%)**
Normal	115	37
Mild esophagitis	119	39
Moderate- severe esophagitis	27	9
Mild dysplasia	35	11.5
Moderate dysplasia	8	2.6
Severe dysplasia	1	0.3

14.4%

RESULTS

Prevalence of dysplasia, by participant characteristics

Characteristic	Category	Worst Biopsy Diagnosis		Dysplasia Prevalence (%, 95% CI)	p-value
		Normal (n=261)	Dysplasia (n=44)		
Mean age (mean, SD)		46 (15)	51 (15)		0.04
Sex	Male	137	26	16 (11-22)	
	Female	124	18	13 (8-19)	0.5
Location	A	79	19	19 (12-29)	
	B	48	13	21 (12-34)	
	C	133	12	8 (4-14)	0.01
Post primary education	No	166	34	17 (12-23)	
	Yes	95	10	10 (5-17)	0.09
Tobacco smokers	No	214	31	13 (9-17)	
	Yes	47	13	22 (12-34)	0.1
Alcohol drinkers	No	185	21	10 (6-15)	
	Yes	75	23	23 (16-33)	0.003
FH of esophageal cancer	No	243	42	15 (11-19)	
	Yes	17	2	11 (1-33)	1.00

RESULTS

Prevalence of dysplasia (ESD) by age and sex

Characteristic		Worst Biopsy Diagnosis: Normal[1] (n= 261)	Worst Biopsy Diagnosis: Dysplasia[2] (n=44)	Dysplasia Prevalence (%, 95% CI)
Age	<30	49	3	6 (1-16)
	30-39	57	9	14 (6-24)
	40-49	39	6	13 (5-27)
	50-59	57	10	15 (7-26)
	≥60	59	16	21 (13-32)
Age: Male	<30	21	2	9 (1-28)
	30-39	31	4	11 (3-27)
	40-49	21	3	13 (3-32)
	50-59	29	8	22 (9-38)
	≥60	35	9	20 (10-35)
Age: Female	<30	28	1	3 (0.1-18)
	30-39	26	5	16 (5-34)
	40-49	18	3	14 (3-36)
	50-59	28	2	7 (1-22)
	≥60	24	7	23 (10-41)

[1] Normal squamous epithelium and esophagitis; [2] Mild, moderate and severe dysplasia

RESULTS

Univariate and multivariate adjusted odds ratios for dysplasia in the STEP study

	Odds ratios (95% CI)	
Characteristic	Univariate	Multivariate
Age	1.02 (1.00, 1.04)	1.01 (0.99-1.04)
Male	1.31 (0.68-2.50)	0.87 (0.41-1.87)
Location (Compared to C)		
A	2.67 (1.23-5.78)	2.55 (1.14-5.72)
B	3.00 (1.28-7.03)	2.84 (1.19-6.78)
Tobacco smokers	1.90 (0.93-3.93)	0.86 (0.34-2.19)
Alcohol drinkers	2.70 (1.41- 5.17)	2.35 (1.11-6.04)
Family history of cancer	1.03 (0.37-2.81)	0.90 (0.32-2.56)

DIRECT study

225 of the enrolled subjects have completed the questio

- 18 out of the 143 subjects have esophageal squamous dysplasia.
- high grade dysplasia 4 and 4 had moderate grade dysplasia.
- The mean age of the proband at diagnosis is 62.46 and the mean age of the subjects enrolled so far is 38.97. Majority of the subjects were children to the proband with the average difference of age 23.48.

RESULTS

Results of the STEP Study in perspective

Prevalence of Dysplasia and HGD, by Population

Population	Ages Screened	Total Dysplasia (%)	High-Grade Dysplasia (%)
China	50-64	30	15
Iran	40-75	6	1.4
Kenya	20-79	14	3.0

- In Iran and Kenya, endoscopic screening will be less cost-effective than in China, and in Kenya, the required infrastructure is rarely available
- Endoscopic screening is safe, feasible and reproducible in Africa

Difficult questions

- What is in the different zones that is contributing to dysplasia?
- How do we increase detection of dysplasia given the relatively low prevalence?
- Identifying a biomarker that will make detection easier?
- Endoscopy equipment for screening- cost and maintenance

Acknowledgments

- AORTIC - African Organization for Research & Training in Cancer
- NIH- National Institute of Health/ National Cancer Insitute, USA
- Department of Pathology, University of Nairobi
- Mayo Clinic, USA
- Tenwek Endoscopy Team
- CICAMS- Chinese Cancer Institute


Thank you!